heating power, a layer-shaped heating conductor being embedded in the heating element; and

at least one electrode, each electrode arranged on a respective surface of the measuring cell layer;

wherein the layer-shaped heating conductor is arranged in a layer plane of the layer structure to obtain an at least approximately homogeneous distribution of the heating power over a cross-section of the sensor element perpendicular to the layer structure; and

wherein the layer plane is centered with respect to the sensor element.

REMARKS

I. INTRODUCTION

Claims 1 and 3 to 7 are currently pending in this application. In view of the foregoing amendments and the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

II. REJECTION OF CLAIMS 1 AND 3 TO 5 UNDER 35 U.S.C. § 102(b)

Claims 1 and 3 to 5 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 4,505,806 ("Yamada '806") or U.S. Patent No. 4,505,807 ("Yamada '807"). Applicants respectfully submit that neither Yamada '806 nor Yamada '807 anticipates the present claims as amended herein for the following reasons.

Claim 1 relates to a planar sensor element for determining at least one gas component and recites that the planar sensor element includes a layer structure. Claim 1 further recites that the layer structure includes a measuring cell layer, a covering layer, a heating element disposed between the measuring cell layer and the covering layer and generating a heating power, and a layer-shaped heating conductor embedded in the heating element. Claim 1 recites that the layer-shaped heating conductor is arranged in a layer

plane of the layer structure to obtain an at least approximately homogeneous distribution of the heating power over a cross-section of the sensor element perpendicular to the layer structure and that the layer plane is centered with respect to the sensor element. Claim 1 has been amended herein to recite that the measuring cell layer includes at least one surface and that the layer structure includes at least one electrode, each arranged on a respective surface of the measuring cell layer as described, for example, on page 3, lines 7 to 16 of the Specification.

Yamada '806 purports to relate to an oxygen sensor. The Office Action dated January 2, 2002 contends that Yamada '806 "discloses . . . a heating conductor 16a located in a plane approximately half way between the top and the bottom of a sensor element" and that "[l]ayer 13'a can be considered to be the 'measuring cell layer', while the bottom layer can be considered to be the covering layer." Office Action dated January 2, 2002, at p. 2. The foregoing belies the description of Yamada '806.

Yamada '806 states at col. 6, lines 30 to 31 that "FIG. 7 and FIG. 8 show a second embodiment of the oxygen sensor," and Yamada '806 states at col. 6, lines 51 to 52 that "FIG. 9 [is] a perspective view of the assembled oxygen sensor according to the second embodiment." The only difference between the second embodiment of the oxygen sensor and the first embodiment of the oxygen sensor is that the second embodiment is stated to include a heat-generating resistor 16a. However, Yamada '806 states at col. 3, line 30 that the oxygen sensor includes an oxygen pump element 1 and states at col. 3, line 53 that the oxygen sensor includes an oxygen concentration cell element 4. Yamada '806 further states at col. 4, lines 4 to 6 that "[a]n intermediate board member 7 is sandwiched between the oxygen pump element 1 and the oxygen concentration cell element 4." With regard to the oxygen pump element 1, Yamada '806 states at col. 6, lines 1 to 8 that "[a] DC voltage of 10 V was applied across the electrode layers 3a of the oxygen pump element 1 through a variable

resistor 17, so as to vary the direct current I through the element 1 in a range of 0.05 - 10 mA for pumping out oxygen from the gas in the cavity at the hole 8 in a controllable fashion" and that "output voltage of the oxygen concentration cell element 4 was controlled at 20 mV." Thus, neither the oxygen pump element 1, the oxygen concentration cell element 4, the element denoted 13'a in Figure 9 nor the bottom layer illustrated in Figure 9 can be properly considered a "covering layer" within the context of the present claims. Furthermore, there is no disclosure or suggestion that a heating power distribution over a cross-section of the oxygen sensor is at least approximately homogeneous perpendicular to the layer structure as recited in claim 1.

Yamada '807 purports to relate to an oxygen sensor. The Office Action dated January 2, 2002 merely states that Yamada '807 "discloses . . . a measuring cell layer 2, a covering layer 1 and a heating conductor 13 located in a plane approximately half way between the top and the bottom of a sensor element." Office Action dated January 2, 2002, at p. 3. Yamada '807 states at col. 3, lines 23 to 26 that an oxygen sensor includes an oxygen concentration cell element 1, an oxygen pump element 2 and a heater element 3. None of these elements define a "covering layer" in the context of the present claims. Furthermore, in view of insulating coating 6, which is stated to be applied to the surface of the insulating plate of the heater element 3, it is respectfully submitted that Yamada '807 specifically fails to disclose the limitation that "the layer-shaped heating conductor is arranged in a layer plane of the layer structure to obtain an at least approximately homogeneous distribution of the heating power over a cross-section of the sensor element perpendicular to the layer structure" as recited in claim 1. Furthermore, as illustrated in Figure 2, Yamada '807 fails to disclose that the layer plane is centered with respect to the sensor element as recited in claim 1.

Moreover, as indicated above, claim 1 has been amended herein to recite that the layer structure includes "at

least one electrode, each electrode arranged on a respective surface of the measuring cell layer." It is respectfully submitted that neither Yamada '806 nor Yamada '807 discloses this feature. Rather, in each embodiment of the oxygen sensors described in Yamada '806 and Yamada '807, an intermediate board is arranged between an oxygen pump element and an oxygen concentration cell element, and metallic electrode layers are "attached" to both sides of each element. See, e.g., Yamada '806, col. 3, lines 28 to 63; Yamada '807, col. 3, lines 23 to 64. Thus, it is respectfully submitted that neither Yamada '806 nor Yamada '807 discloses an oxygen sensor, in which each of at least one electrode is arranged on a respective surface of a measuring cell layer as recited in amended claim 1.

To anticipate a claim, each and every element as set forth in the claim must be found in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of Calif., 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). That is, the prior art must describe the elements arranged as required by the claims. In re Bond, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). The contentions of the Office Action dated January 2, 2002, that "[l]ayer 13'a can be considered to be the 'measuring cell layer'" and that "the bottom layer can be considered to be the covering layer" demonstrates that the anticipation rejection is flawed. Such analysis ignores the fact that the terms and phrases of a claim are to be understood based on a reasonable interpretation of those terms and phrases as used in the context of the specification. As more fully set forth above, it is respectfully submitted that neither Yamada '806 nor Yamada '807 discloses, or even suggests, the "covering layer," the arrangement of the layer-shaped heating conductor in a layer plane of the layer structure to obtain an at least homogeneous distribution of

the heating power over a cross-section of the sensor element perpendicular to the layer structure or the arrangement of the at least one electrode as recited in amended claim 1. It is therefore respectfully submitted that neither Yamada '806 nor Yamada '807 anticipates amended claim 1.

Additionally, to reject a claim under 35 U.S.C. § 102, the Examiner must demonstrate that each and every claim limitation is contained in a single prior art reference. See, Scripps Clinic & Research Foundation v. Genentech, Inc., 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991). Still further, not only must each of the claim limitations be identically disclosed, an anticipatory reference must also enable a person having ordinary skill in the art to practice the claimed invention, namely the inventions of the rejected claims, as discussed above. See, Akzo, N.V. v. U.S.I.T.C., 1 U.S.P.Q.2d 1241, 1245 (Fed. Cir. 1986). In particular, it is respectfully submitted that, at least for the reasons discussed above, the reference relied upon would not enable a person having ordinary skill in the art to practice the inventions of the rejected claims, as discussed above. Also, to the extent that the Examiner is relying on the doctrine of inherency, the Examiner must provide a "basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristics necessarily flows from the teachings of the applied art." See M.P.E.P. § 2112; emphasis in original; and see, Ex parte Levy, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). Thus, the M.P.E.P. and the case law make clear that simply because a certain result or characteristic may occur in the prior art does not establish the inherency of that result or characteristic. Accordingly, the anticipation rejection as to the rejected claims must necessarily fail for the foregoing reasons.

For at least the forgoing reasons, it is respectfully submitted that neither Yamada '806 nor Yamada '807 anticipates amended claim 1.

With regard to claims 3 to 5, which ultimately depend from claim 1 and therefore include all of the

limitations of claim 1, it is respectfully submitted that neither Yamada '806 nor Yamada '807 anticipates these dependent claims for at least the same reasons given above in support of the patentability of claim 1.

III. REJECTION OF CLAIMS 1 AND 3 TO 7 UNDER 35 U.S.C. § 103(a)

Claims 1 and 3 to 7 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 5,529,677 ("Schneider et al.") in view of Yamada '806 or Yamada '807. It is respectfully submitted that the combination of Schneider et al. and Yamada '806 or Yamada '807 does not render unpatentable the present claims as amended herein for the following reasons.

Schneider et al. purport to relate to a planar polarographic sensor for determining the lambda value of gas mixtures. Three embodiments are described by Schneider et al., each of which includes a heating unit C having a heater 27. In none of the three embodiments is the heater 27 arranged between the measuring cell layer and the covering layer to obtain at least an approximately homogeneous distribution of heating power over a cross-section of the sensor element perpendicular to the layer structure as recited in claim 1. Furthermore, as admitted in the Office Action dated January 2, 2002, Schneider et al. do not disclose that the layer plane is centered with respect to the sensor element as recited in claim 1. Moreover, as described, for example, on page 1, lines 25 to 29 of the Specification, "[d]ue to [the] highly asymmetrical arrangement of the heating element [described by Schneider et al.] with respect to the layer sequence of the layer structure, the cover foil heats up much more than the layer structure provided with function layers."

As indicated above, neither Yamada '806 nor Yamada '807 discloses, or even suggests, the arrangement of the heating element as recited in amended claim 1. Moreover, as admitted in the Office Action dated January 2, 2002, Schneider et al. do not disclose, or even suggest, the arrangement of the heating element as recited in claim 1. It is therefore

respectfully submitted that the rejection must necessarily fail at least because it is improperly based solely on the Specification of the present application and not on the references cited as required.

The Office Action dated January 2, 2002 contends that Schneider et al. "disclose[] applicant's basic sensor element" but admits that Schneider et al. fail to disclose the heating conductor located in a layer plane, in which "the layer plane is centered with respect to the sensor element." However, the Office Action dated January 2, 2002, contends that "[i]t would have been obvious for Schneider [et al.] to locate his heating conductor in a centered plane as shown by either Yamada, because such a location would permit even heat distribution between the top and the bottom of the sensor element" and that "[t]emperature gradient within a sensor element may cause inaccurate measurement as well as cause thermal shock damage." Office Action dated January 2, 2002, at p. 3.

The present Final Office Action attempts to provide support for the forgoing alleged motivation to combine Schneider et al. with either Yamada '806 or Yamada '807 by asserting that "[it] is common knowledge that electrolyte measurement is temperature-sensitive . . . [and that] it is fundamental physics that significant temperature gradient between different portions of one element can cause cracking from thermal stress." Final Office Action dated June 4, 2002, at p. 3.

As an initial matter, Applicants do not admit that it is common knowledge that electrolyte measurement is temperature-sensitive or that fundamental physics necessarily dictates that a significant temperature gradient between different portions of one element can cause cracking from thermal stress. Applicants respectfully traverse these contentions to the extent that they are maintained and request that the Examiner provide specific evidence to establish those assertions and/or contentions under 37 C.F.R. § 1.104(d)(2) or otherwise. In particular, it is respectfully requested that

the Examiner provide an affidavit and/or that the Examiner provide published information concerning these assertions. This is because this rejection is apparently being based on assertions that draw on facts within the personal knowledge of the Examiner, since no support was provided for these otherwise conclusory and unsupported assertions. (See also M.P.E.P. § 2144.03).

Moreover, whether it is common knowledge that electrolyte measurement is temperature-sensitive or that fundamental physics dictates that a significant temperature gradient can cause cracking -- which Applicants do not admit -- does not, in and of itself, create the motivation required to combine Schneider et al. with either Yamada '806 or Yamada '807. Essentially, the foregoing unsupported assertions establish only that the cause of a possible problem with electrolytic temperature measurement devices may be known. However, just because a possible problem and its cause may be well known, does not necessarily mean that a proposed solution, no matter how technologically simple it may appear, is also well known. In other words, the inquiry is not whether the cause of a problem may be obvious, but rather whether the proposed solution, taken as a whole within the context of the claim under examination, would have been obvious to the ordinary artisan.

As indicated in Applicants' Specification, placing the heating conductor in a layer plane "centered with respect to the sensor element" is advantageous in that the heating power is homogeneously distributed over the cross-section of the sensor element. Thus, a resistance of the sensor element to temperature variations and thermal shock is improved.

However, none of the references cited in any of the Office Actions to date disclose, teach, or suggest that placing the heating conductor in a layer plane "centered with respect to the sensor element," as recited in claim 1, produces any advantages whatsoever.

The Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d

1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). As more fully set forth above, it is respectfully submitted that the combination of Schneider et al. and Yamada '806 or Yamada '807 fails to disclose, or even suggest, all of the limitations of amended claim 1. It is therefore respectfully submitted that the combination of Schneider et al. and Yamada '806 or Yamada '807 does not render obvious amended claim 1.

The cases of In re Fine, supra, and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that the generalized assertions of both the Office Action dated January 2, 2002 and the present Final Office Action that it would have been obvious to modify or combine the references, do not properly support a § 103 rejection. It is respectfully submitted that those cases make plain that the Office Actions reflect a subjective "obvious to try" standard, and therefore do not reflect the proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

> The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. This it has not done. . . .
>
> . . . .

> **Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.**

In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added). Likewise, the Court in the case of In re Jones stated that:

> Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .
>
> **Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].**

In re Jones, 21 U.S.P.Q.2d at 1943, 1944 (citations omitted; italics in original).

That is exactly the case here since it is believed and respectfully submitted that the present Final Office Action, as well as all previous Office Actions to date, offers no evidence whatsoever, but only conclusory hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding. Unsupported assertions are not evidence as to why a person having ordinary skill in the art would be motivated to modify or combine references to provide the claimed subject matter of the claims to address the problems met thereby. Accordingly, the Office must provide proper evidence of a motivation for modifying or combining the references to provide the claimed subject matter.

More recently, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not the case

here -- there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed," stating that:

> In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed. In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper prima facie case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Fed. Cir. 2000) (emphasis added). Again, it is believed that there have been no such findings.

The Federal Circuit in the case of In re Zurko has also made plain that reliance on general conclusions of what is "basic knowledge" or "common sense" cannot remedy the deficiencies of cited references, stating that:

> [t]he deficiencies of the cited references cannot be remedied by the Board's general conclusions about what is "basic knowledge" or "common sense" to one of ordinary skill in the art. . . . We cannot accept these findings [of alleged "basic knowledge" and "good common sense"] by the Board. This assessment of basic knowledge and common sense was not based on any evidence in the record and, therefore, lacks substantial evidence support. . . . With respect to core factual findings in a determination of patentability, however, the Board cannot simply reach conclusions based on its own understanding or experience -- or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point

> to some concrete evidence in the record to support these findings.

In re Zurko, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001).

The Federal Circuit further stated in the case of In re Lee that "'Common knowledge and common sense,' even if assumed to derive from the agency's expertise, do not substitute for authority when the law requires authority." In re Lee, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002). The Federal Circuit further stated that:

> The determination of patentability on the ground of unobviousness is ultimately one of judgment. In furtherance of the judgmental process, the patent examination procedure serves both to find, and to place on the official record, that which has been considered with respect to patentability. The patent examiner and the Board are deemed to have experience in the field of the invention; however, this experience, insofar as applied to the determination of patentability, must be applied from the viewpoint of "the person having ordinary skill in the art to which said subject matter pertains," the words of section 103. In finding the relevant facts, in assessing the significance of the prior art, and in making the ultimate determination of the issue of obviousness, the examiner and the Board are presumed to act from this viewpoint. Thus when they rely on what they assert to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record. The failure to do so is not consistent with either effective administrative procedure or effective judicial review. The board cannot rely on conclusory statements when dealing with particular combinations of prior art and specific claims, but must set forth the rationale on which it relies.

In re Lee, supra, 61 U.S.P.Q.2d at 1435.

It is therefore respectfully submitted that the unsupported assertions that "[i]t is common knowledge that electrolytic measurement is temperature-sensitive" and that "it is fundamental physics that significant temperature gradient between different portions of one element can cause

cracking from thermal stress" do not provide the suggestion or motivation to make the proposed combination of Schneider et al. and Yamada '806 or Yamada '807.

Accordingly, it is respectfully submitted that there is no evidence that the references relied upon, whether taken alone, combined or modified, would provide the features and benefits of claim 1 as amended herein. It is therefore respectfully submitted that amended claim 1 is allowable for these reasons.

As for claims 3 to 7, which ultimately depend from claim 1 and therefore include all of the limitations of claim 1, it is respectfully submitted that the combination of Schneider et al. and Yamada '806 or Yamada '807 does not render obvious these dependent claims for at least the same reasons given above in support of the patentability of claim 1. In re Fine, supra (any dependent claim depending from a non-obvious independent claim is non-obvious).

IV. CONCLUSION

Attached hereto is a marked-up copy of the changes made to claim claims by the current Reply Under 37 C.F.R. § 1.116. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

KENYON & KENYON

Dated: 8/8, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 1 has been amended without prejudice as follows:

1. (Six Times Amended) A planar sensor element for determining at least one gas component, comprising:

a layer structure including:

a measuring cell layer having at least one surface;

a covering layer;

a heating element disposed between the measuring cell layer and the covering layer and generating a heating power, a layer-shaped heating conductor being embedded in the heating element[,]; and

at least one electrode, each electrode arranged on a respective surface of the measuring cell layer;

wherein the layer-shaped heating conductor is arranged in a layer plane of the layer structure to obtain an at least approximately homogeneous distribution of the heating power over a cross-section of the sensor element perpendicular to the layer structure; and

wherein the layer plane is centered with respect to the sensor element.